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Examiner Marc E. Norman, Group 3744	Peter D. McDermott
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Title: PULSED FLOW FOR CAPACITY CONTROL
Inventor: Lifson, A.

If you do not receive all page(s) or have any problems receiving this transmission, please call:

NAME: Peter McDermott/ Rachelle Chery PHONE: 617-227-7111

Dear Examiner Norman,

Applicant wish to submit the enclosed Supplemental Paper for Request for Interference Under 37 C.F.R. § 1.607.

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Respectfully submitted,

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Rachelle Chery 11/14/02
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011670.00006 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	**Lifson, Alexander**	**Group Art Unit:**	**3744**
Serial No.:	**09/921,334**	**Examiner:**	**Norman, M.**
Filed:	**August 03, 2001**		
For:	**PULSED FLOW FOR CAPACITY CONTROL**		
Original Filing Date:	**December 8, 1997**		
Original Patent No:	**6,047,556**		
Granted:	**April 11, 2000**		

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SUPPLEMENTAL PAPER FOR
REQUEST FOR INTERFERENCE UNDER 37 C.F.R. § 1.607

Dear Sir:

This paper is filed supplemental to a Request for Interference under 37 C.F.R. § 1.607 (filed on August 3, 2001) to clarify further the interfering subject matter of the above-referenced reissue application (U.S. 09/921,334) and U.S. Patent No. 6,206,652 granted to Caillat (hereafter referred to as "Caillat").

In the Request for Interference under 37 C.F.R. § 1.607, Applicant requested that the Examiner declare an interference between selected claims of the instant reissue application and the claims of Caillat. In keeping with U.S. Patent Office practice and procedures, the determination of interference by Examiner Norman was postponed until the claims of the instant reissue application were in condition for allowance.

In a first Office Action, original claims 1-3 were allowed. Applicant filed a Response to the Office Action and discussed the patentability of claims 4-38 in an interview with Examiner Norman on 5 September 2002. On 11 September 2002,

Applicant filed a Supplemental Response to Office Action.[1] Claims 20 and 26 were cancelled without prejudice to Applicant's right to pursue the subject matter of those claims in another application.

In a Second Supplemental Response to Office Action filed on 8 October 2002, Applicant amended claims 4, 9, 14, 17, 24, 29, 33 and 35 to more distinctly define and particularly characterize the reissue claims.

Because all claims of the reissue application are believed to be in condition for allowance, Applicant requests that the Examiner now declare an interference between selected claims of the instant reissue application and the claims of Caillat. To assist the Examiner in declaring an interference, the interfering subject matter of the reissue claims and Caillat's claims is detailed below.

I. Applicant Requests Declaration of an Interference Between the Instant Reissue Application and Caillat

Applicant requests that an interference be declared between claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application, having an effective filing date of December 8, 1997, and claims 1-29 of Caillat, issued on March 27, 2001 and having an effective filing date of August 25, 1998. In view of the respective effective filing dates, Applicant should be declared senior party.

II. Proposed Counts

Applicant proposes the following counts.

Count I

Claim 4 of US 09/921,334 or claim 1 of Caillat.

[1] On 17 September 2002, Applicant filed a Substitute Supplemental Response to Office Action in which Applicant amended the claims to comply with the reissue rules for underlining amended claims.

Alternative Count I

An air conditioning or refrigeration system comprising a compressor having a refrigeration fluid suction line and a suction line valve in the refrigeration fluid suction line, the suction line valve being cyclable between open and closed positions, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation, the suction line valve operative to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.

Count II

Claim 33 of US 09/921,334 or Claim 29 of Caillat.

Alternative Count II

A method of modulating the capacity of a compressor comprising cycling a suction line valve, in fluid communication with the compressor, using a cycle time shorter than the response time of the system to modulate compressor capacity, the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor, the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.

III. Claims in the Instant Reissue Application and in Caillat that Correspond to Proposed Count I, Proposed Alternative Count I, Count II and Proposed Alternative Count II[2]

a. Count I

Claims 4-13, 17-19, 21-23 and 29-32 of the instant reissue application and Claims 1-28 of Caillat correspond to proposed Count I.

[2] Please see discussion of claim language in Section IV below.

b. Alternative Count I

Claims 4-13, 17-19, 21-23 and 29-32 of the instant reissue application and Claims 1-28 of Caillat correspond to proposed Alternative Count I.

c. Count II

Claims 33-34 of the instant reissue application and Claim 29 of Caillat correspond to proposed Count II.

d. Alternative Count II

Claims 33-34 of the instant reissue application and Claim 29 of Caillat correspond to proposed Alternative Count II.

IV. The Claim Language Used in the Instant Reissue Application and the Claim Language used in Caillat Define Interfering Subject Matter

(a) Overview

A typical air conditioning or refrigeration system has a compressor that receives refrigerant from a suction line. The compressor compresses the refrigerant causing the temperature of the refrigerant to increase. The compressed refrigerant passes from the compressor by a discharge line to a condenser in which it cools. The cooled refrigerant passes from the condenser through a throttle valve to an evaporator that allows the refrigerant to absorb heat. A fan blows air, e.g. from a building, over the evaporator coils to cool down the air, which is then returned to the building.

In accordance with the subject matter of selected reissue claims, to increase the efficiency of the entire air conditioning or refrigeration system, a valve is provided in a suction line. Opening of the suction line valve allows for refrigerant fluid flow into the compressor. In normal operation, closing of the suction line valve prevents any refrigerant fluid flow into the compressor, other than optionally permitting a limited flow to prevent vacuum pump operation.

Also in accordance with the subject matter of selected instant reissue claims (claims 4-13, 17-19, 21-23 and 29-34), a suction line valve is operative to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity. At column 1, lines 32-35, the specification of the instant reissue application states:

> because the cycling time [of the suction line valve] is so much shorter than the response time of the system, it is as though the valve(s) are partially opened rather than being cycled between their open and closed positions.

Therefore, by cycling the valve using a cycling time shorter than the response time of the system, the compressor capacity is modulated which results in a more efficient air conditioning or refrigeration system.

As discussed in more detail below, instant reissue claims 4-13, 17-19, 21-23, and 29-34 and claims 1-29 of Caillat are directed to the same interfering subject matter. That is, instant reissue claims 4-13, 17-19, 21-23 and 29-34 and claims 1-29 of Caillat call for a valve with a cycling time less than the time required for the controlled variable (typically, e.g., pressure, temperature or flow of the system) to reach a specified value, to modulate compressor capacity.

(b) Terms Used in the Reissue Claims and in Caillat Have the Same Meaning

Even though the claim language used in the instant reissue application and in Caillat is not *ipsis verbis* the same, the meaning of the claim language, in the context of the present inventive subject matter, defines the same subject matter under 37 C.F.R. § 1.601(n). As further discussed below, the subject matter of claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application is the same as the subject matter of Caillat's claims 1-29, or in the alternative, the subject matter of claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application is obvious in view of Caillat's claims 1-29. Likewise, the subject matter of Caillat's claims 1-29 is the same as the subject matter of instant reissue claims 4-13, 17-19, 21-23 and 29-34, or in the alternative, the subject

matter of Caillat's claims 1-29 is obvious in view of instant reissue claims 4-13, 17-19, 21-23 and 29-34.

Each of claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application recites a valve cycled "with a cycling time shorter than the response time of the system to control fluid flow to the compressor to modulate compressor capacity."

Each of claims 1-16 of Caillat recites "cycling a valve such that its cycle time is substantially smaller than the time constant of the load on said compressor." Each of claims 17-28 of Caillat recites "actuating said valve to an open position for first predetermined time periods and to a closed position for second predetermined time periods, the ratio of said first predetermined time periods to the sum of said first and second predetermined time periods being less than a given load time constant and determining the percentage modulation of the capacity of said compressor." Similarly, claim 29 of Caillat recites "pulsing a valve between open and closed positions for said first and second time periods respectively to thereby modulate the capacity of said compressor in response to said system operating parameter."

The claim language used in the instant reissue claims (claims 4-13, 17-19, 21-23 and 2934) defines the same subject matter, in the context of the claimed invention, as the claim language used in Caillat (claims 1-29). Because the claim language of the instant reissue application and the claims of Caillat define the same subject matter, an interference between claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and Caillat's claims 1-29 should be declared.

(c) Definitions

Response Time: As used in *Mark's Standard Handbook for Mechanical Engineers*, Eighth Edition, 1978, pp. 16-25, response time is the time required for the controlled variable to reach a specified value after the application of a step input or disturbance. As used in the *McGraw-Hill Dictionary of Scientific and Technical Terms*, Third Edition, 1984, response time is the time required for the output of a control system

or element to reach a specified fraction of its new value after application of a step input or disturbance.

Time Constant: As used in the *McGraw-Hill Dictionary of Scientific and Technical Terms,* time constant is (a) the time required for a physical quantity to rise from zero to 1-(1/e) (63.2%) of its final steady state value when it varies with time as e^{-kt} (where t is time and k is a constant); (b) the time required for a physical quantity to fall to 1/e (that is, 36.8%) of its initial value when it varies with time as e^{-kt}; (c) generally, the time required for an instrument to indicate a given percentage of the final reading resulting from an input signal."

(d) Application of Definitions to Claim Language

Based on these definitions, the terms time constant and response time have the same meaning. That is, in the context of the instant reissue claims and Caillat's claims, the time required for a controlled variable to reach a specified value (definition of response time) means the same as the time required for a physical quantity, i.e. a controlled variable, to reach a specified value (definition of time constant).

In view of the interchangeability of the terms response time and time constant, claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and claims 1-29 of Caillat define interfering subject matter. In particular (as summarized in Table I below), Caillat's recitation in claims 1-16 of "cycling a valve such that its cycle time is substantially smaller than the time constant of the load on said compressor" has the same meaning to those skilled in the art, in the context of the claimed invention, as Applicant's recitation in claims 4-13, 17-19, 21-23 and 29-32 of "a valve operative to cycle with a cycling time shorter than the response time of the system to control fluid flow to the compressor to modulate compressor capacity."

Table I

	Claims 4-13, 17-19, 21-23 and 29-32 of the Instant Reissue Claims	Claims 1-16 of Caillat
Claim Language	"...**valve**, in fluid communication with the compressor, **operative to cycle with a cycling time shorter than the response time of the system** to control fluid flow to the compressor to modulate compressor capacity."	"...**to cycle said valve such that its cycle time is substantially smaller than the time constant of the load on said compressor**."
Meaning of bolded text to those skilled in the art	a valve with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity	a valve with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity

Therefore, claims 4-13, 17-19, 21-23 and 29-32 of the instant reissue application and claims 1-16 of Caillat define interfering subject matter.

Claims 4-13, 17-19, 21-23 and 29-32 of the instant reissue application and the claims 17-28 of Caillat define interfering subject matter. In particular (as summarized in Table II below), Caillat's recitation in claims 17-28 of "actuating said valve to an open position for first predetermined time periods and to a closed position for second predetermined time periods, the ratio of said first predetermined time periods to the sum of said first and second predetermined time periods being less than a given load time constant and determining the percentage modulation of the capacity of said compressor" has the same meaning to those skilled in the art, in the context of the claimed invention, as Applicant's recitation in claims 4-13, 17-19, 21-23 and 29-32 of "a valve operative to

cycle with a cycling time shorter than the response time of the system to modulate compressor capacity."

Table II

	Claims 4-13, 17-19, 21-23 and 29-32 Of the Instant Reissue Claims	Claims 17-28 of Caillat
Claim Language	"...**valve,** in fluid communication with the compressor, **operative to cycle with a cycling time shorter than the response time of the system** to control fluid flow to the compressor to modulate compressor capacity."	"...**a valve, ... actuating said valve to an open position for first predetermined time periods and to a closed position for second predetermined time periods, the ratio of said first predetermined time periods to the sum of said first and second predetermined time periods being less than a given load time constant** and determining the percentage **modulation of the capacity of said compressor.**"
Meaning of bolded text to those skilled in the art	a valve cycled with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity	a valve cycled with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity

Therefore, claims 4-13, 17-19, 21-23 and 29-32 of the instant reissue application and claims 17-28 of Caillat define interfering subject matter.

Each of claims 33-34 of the instant reissue application and claim 29 of Caillat defines interfering subject matter. In particular (as summarized in Table III below), Caillat's recitation of "pulsing a valve between open and closed positions for said first and second time periods respectively to thereby modulate the capacity of said compressor in response to said system operating parameter" has the same meaning to those skilled in

the art, in the context of the claimed invention, as Applicant's recitation of "cycling a suction line valve, in fluid communication with the compressor, using a cycle time shorter than the response time of the system to modulate compressor capacity."

Table III

	Claims 33-34 of the Instant Reissue Claims	Claim 29 of Caillat
Claim Language	"...**cycling a suction line valve**, in fluid communication with the compressor, **using a cycle time shorter than the response time of the system** to modulate compressor capacity, the suction line valve being cyclable between open and closed positions..."	"...**pulsing a valve between open and closed positions for said first and second time periods respectively to thereby modulate the capacity of said compressor** in response to said system operating parameter."
Meaning of bolded text to those skilled in the art	Cycling a valve with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity	Cycling a valve with a cycling time less than the time required for the controlled variable to reach a specified value, to modulate compressor capacity

Therefore, each of claims 33-34 of the instant reissue application and claim 29 of Caillat define interfering subject matter.

As discussed above, although the claim language of the claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and claims 1-29 of Caillat differs literally, the meaning of the claim language to those skilled in the art, in the context of the claimed invention, is the same. Because the meaning of the claim language is the same, claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and claims 1-29 of Caillat define interfering subject matter. Accordingly, an interference should be declared between instant reissue claims 4-13, 17-19, 21-23 and 29-34 and claims 1-29 of Caillat.

V. Supporting Language for Claims 4-13, 17-19, 21-23 and 29-34 of the Instant Reissue Application

The terms of each of claims 4-13, 17-19, 21-23 and 29-32 corresponding to proposed Count I are supported in Applicant's specification as shown in attached Exhibit A.

The terms of each of claims 4-13, 17-19, 21-23 and 29-32 corresponding to proposed Alternative Count II are supported in Applicant's specification as shown in attached Exhibit B.

The terms of each of claims 33-34 corresponding to proposed Count II are support in Applicant's specification as shown in attached Exhibit C.

The terms of each of claims 33-34 corresponding to proposed Alternative Count II are supported in Applicant's specification as shown in attached Exhibit D.

The support shown in each of Exhibits A-D is, in general, merely exemplary and/or illustrative of the full support provided by the specification, figure, abstract and claims.

VI. The Requirements of 35 U.S.C. § 135(b) are Satisfied

Because the instant reissue application was filed on August 03, 2001 (and has an effective filing date of December 8, 1997), which is within one year of issuance of Caillat (Caillat issued on March 27, 2001), the requirements of 35 U.S.C. § 135(b) are not applicable or have been met.

VII. Applicant is *Prima Facie* Entitled to Judgment on Priority

Because Applicant's effective filing date of December 8, 1997 is over eight months prior to the effective filing date of Caillat, which is August 25, 1998, Applicant is *prima facie* entitled to judgment on priority with respect to the effective filing date of the instant reissue application. That is, because Applicant's effective filing date pre-dates the effective filing date of Caillat by over eight months, Applicant is entitled to judgment on

priority with respect to the interfering subject matter defined by instant reissue claims 4-13, 17-19, 21-23 and 29-34 and claims 1-29 of Caillat.

VIII. Conclusion

An interference should be declared between claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and claims 1-29 of Caillat, and Applicant is *prima facie* entitled to judgment on priority with respect to the interfering subject matter defined by instant reissue claims 4-13, 17-19, 21-23 and 29-34 and claims 1-29 of Caillat.

Applicant respectfully requests declaration of an interference between claims 4-13, 17-19, 21-23 and 29-34 of the instant reissue application and claims 1-29 of Caillat.

Respectfully submitted,
Lifson, A.

Date: 14 November 2002

By _____
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CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being faxed to Attn: Examiner Marc E. Norman, Assistant Commissioner for Patents, Box REISSUE, Washington, D.C. 20231, fax # 703-872-9302 on: November 14, 2002

_____ 14 November 2002
Rachelle Chery *Date*

EXHIBIT A

Claim Language	Supporting Language in the Specification
Claim 4. An air conditioning or refrigeration system comprising:	Abstract and Figure
an evaporator;	Evaporator 22 in the Figure
a compressor;	Compressor 12 in the Figure
a refrigeration fluid suction line from the evaporator to the compressor; and	Line 24 in the Figure
a suction line valve, in the refrigeration fluid suction line	Valve 54 in the Figure
being cyclable between open and closed positions,	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
the suction line valve operative to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 5. The air conditioning or refrigeration system of claim 4 further comprising a capacity controller operative to generate a control signal corresponding to desired capacity modulation and operatively connected to the valve to send capacity control signals to cycle the valve with a cycling time shorter than the response time of the system to modulate compressor capacity.	Microprocessor controller 100 in Fig 1; Column 2, line 22-23 Abstract; Fig. 1; Column 1, lines 26-30; Column 2, lines 26-48
Claim 6. The air conditioning or refrigeration system of claim 4 wherein the valve is cycled between a fully open and a fully closed position.	Column 1, lines 25-27
Claim 7. The air conditioning or refrigeration system of claim 5 wherein the controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 8. The air conditioning or refrigeration system of claim 4 wherein the valve is a solenoid valve.	Column 1, lines 25-27

Claim Language	Supporting Language in the Specification
Claim 9. An air conditioning or refrigeration system comprising:	Abstract and Figure
an evaporator;	Evaporator 22 in the Figure
a compressor;	Compressor 12 in the Figure
a refrigeration fluid suction line from the evaporator to the compressor	Line 24 in the Figure
the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to the compressor	Column 2, lines 32-37
a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and	Figure; Column 2, lines 22-25
a suction line valve, in the refrigeration fluid suction line,	Valve 54 in the Figure
operatively connected to the controller to receive capacity control signals from the controller and	Figure; Column 2, lines 22-25
being cyclable between open and closed positions	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
the suction line valve operative in response to capacity control signals received from the controller	Column 1, lines 32-35; Column 2, lines 26-48
to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 10. The system of claim 9 wherein the valve is cycled between a fully open position and a fully closed position.	Column 1, lines 25-27
Claim 11. The system of claim 9 wherein the system capacity controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 12. The system of claim 9 wherein the valve is a solenoid valve.	Column 1, lines 25-27
Claim 13. The system of claim 10 wherein the valve in the fully closed position permits a limited fluid flow through the refrigerant flow line.	Column 2, lines 46-48

Claim Language	Supporting Language in the Specification
Claim 17. A capacity modulated compressor for an air conditioning or refrigeration system comprising:	Figure; Column 1, line 65 to Column 2, line 48
a compressor housing comprising a compression chamber,	Figure; Column 2, lines 32-37
a refrigeration fluid suction line operative to pass refrigerant to the compression chamber	Figure; Column 1, lines 27-30
and at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber;	Line 14 in the Figure; Column 2, lines 26-37
a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and	Figure; Column 2, lines 22-25
a suction line valve, in the refrigeration fluid suction line,	Valve 54 in the Figure; Column 1 lines 27-30
operatively connected to the controller to receive capacity control signals from the controller and	Figure; Column 2, lines 22-25
being cyclable between open and closed positions,	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation.	Column 2, lines 46-48
the suction line valve operative in response to capacity control signals received from the controller	Column 2, lines 26-48
to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 18. The compressor of claim 17 wherein the valve is cycled between a fully closed position and a fully open position.	Column 1, lines 25-27
Claim 19. The compressor of claim 17 wherein the valve is disposed in a refrigerant flow line upstream with respect to refrigerant flow to said at least one refrigerant injection port.	Fig. 1; Column 2, lines 6-25
Claim 21. The compressor of claim 17 wherein the system capacity controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 22. The compressor of claim 17 wherein the valve is a solenoid valve.	Column 1, lines 25-27
Claim 23. The compressor of claim 18 wherein the valve in the fully closed position permits a limited fluid flow through the refrigerant flow line.	Column 2, lines 46-48

Claim Language	Supporting Language in the Specification
Claim 29. A capacity modulated compressor comprising:	Figure; Column 1, line 65 to Column 2, line 48
a compressor having a refrigeration fluid suction line for supplying refrigeration fluid to the compressor;	the Figure; Column 2, lines 32-37
a suction line valve provided in the suction line to the compressor,	valve 54 in the Figure
the suction line valve being operable between open and closed positions positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,	Column 2, lines 32-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally	Column 2, lines 32-37
other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
a controller for actuating the suction line valve between the open and closed positions,	Figure; Column 2, lines 22-25
the controller being operative to cycle the suction line valve such that its cycle time is shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 30. The capacity modulated compressor of claim 29 wherein the valve is positioned in close proximity to the compressor.	Abstract; Summary; Fig. 1
Claim 31. The capacity modulated compressor of claim 29 wherein the valve is a bidirectional valve.	Column 1, lines 25-27
Claim 32. The capacity modulated compressor of claim 29	

EXHIBIT B

Claim Language	Supporting Language in the Specification
Claim 4. An air conditioning or refrigeration system comprising:	Abstract and Figure
an evaporator;	Evaporator 22 in the Figure
a compressor;	Compressor 12 in the Figure
a refrigeration fluid suction line from the evaporator to the compressor; and	Line 24 in the Figure
a suction line valve, in the refrigeration fluid suction line	Valve 54 in the Figure
being cyclable between open and closed positions,	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
the suction line valve operative to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 5. The air conditioning or refrigeration system of claim 4 further comprising	
a capacity controller operative to generate a control signal corresponding to desired capacity modulation	Microprocessor controller 100 in Fig 1; Column 2, line 22-23
and operatively connected to the valve to send capacity control signals to cycle the valve with a cycling time shorter than the response time of the system to modulate compressor capacity.	Abstract; Fig. 1; Column 1, lines 26-30; Column 2, lines 26-48
Claim 6. The air conditioning or refrigeration system of claim 4	
wherein the valve is cycled between a fully open and a fully closed position.	Column 1, lines 25-27
Claim 7. The air conditioning or refrigeration system of claim 5 wherein	
the controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 8. The air conditioning or refrigeration system of claim 4 wherein	
the valve is a solenoid valve.	Column 1, lines 25-27

Claim Language	Supporting Language in the Specification
Claim 9. An air conditioning or refrigeration system comprising:	Abstract and Figure
an evaporator;	Evaporator 22 in the Figure
a compressor;	Compressor 12 in the Figure
a refrigeration fluid suction line from the evaporator to the compressor	Line 24 in the Figure
the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to the compressor	Column 2, lines 32-37
a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and	Figure; Column 2, lines 22-25
a suction line valve, in the refrigeration fluid suction line,	Valve 54 in the Figure
operatively connected to the controller to receive capacity control signals from the controller and	Figure; Column 2, lines 22-25
being cyclable between open and closed positions	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
the suction line valve operative in response to capacity control signals received from the controller	Column 1, lines 32-35; Column 2, lines 26-48
to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 10. The system of claim 9 wherein the valve is cycled between a fully open position and a fully closed position.	Column 1, lines 25-27
Claim 11. The system of claim 9 wherein the system capacity controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 12. The system of claim 9 wherein the valve is a solenoid valve.	Column 1, lines 25-27
Claim 13. The system of claim 10 wherein the valve in the fully closed position permits a limited fluid flow through the refrigerant flow line.	Column 2, lines 46-48

Claim Language	Supporting Language in the Specification
Claim 17. A capacity modulated compressor for an air conditioning or refrigeration system comprising:	Figure; Column 1, line 65 to Column 2, line 48
a compressor housing comprising a compression chamber,	Figure; Column 2, lines 32-37
a refrigeration fluid suction line operative to pass refrigerant to the compression chamber	Figure; Column 1, lines 27-30
and at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber;	Line 14 in the Figure; Column 2, lines 26-37
a capacity controller operative to generate a control signal corresponding to desired capacity modulation; and	Figure; Column 2, lines 22-25
a suction line valve, in the refrigeration fluid suction line,	Valve 54 in the Figure; Column 1 lines 27-30
operatively connected to the controller to receive capacity control signals from the controller and	Figure; Column 2, lines 22-25
being cyclable between open and closed positions,	Column 2, lines 41-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor	Column 2, lines 32-37
other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation.	Column 2, lines 46-48
the suction line valve operative in response to capacity control signals received from the controller	Column 2, lines 26-48
to cycle with a cycling time shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 18. The compressor of claim 17 wherein the valve is cycled between a fully closed position and a fully open position.	Column 1, lines 25-27
Claim 19. The compressor of claim 17 wherein the valve is disposed in a refrigerant flow line upstream with respect to refrigerant flow to said at least one refrigerant injection port.	Fig. 1; Column 2, lines 6-25
Claim 21. The compressor of claim 17 wherein the system capacity controller comprises a microprocessor.	Microprocessor controller 100 in Fig 1; Column 2, lines 22-23
Claim 22. The compressor of claim 17 wherein the valve is a solenoid valve.	Column 1, lines 25-27
Claim 23. The compressor of claim 18 wherein the valve in the fully closed position permits a limited fluid flow through the refrigerant flow line.	Column 2, lines 46-48

Claim Language	Supporting Language in the Specification
Claim 29. A capacity modulated compressor comprising:	Figure; Column 1, line 65 to Column 2, line 48
a compressor having a refrigeration fluid suction line for supplying refrigeration fluid to the compressor;	the Figure; Column 2, lines 32-37
a suction line valve provided in the suction line to the compressor,	valve 54 in the Figure
the suction line valve being operable between open and closed positions positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,	Column 2, lines 32-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compressor other than optionally	Column 2, lines 32-37
other than optionally permitting a limited flow through the suction line valve to prevent vacuum pump operation,	Column 2, lines 46-48
a controller for actuating the suction line valve between the open and closed positions,	Figure; Column 2, lines 22-25
the controller being operative to cycle the suction line valve such that its cycle time is shorter than the response time of the system to modulate compressor capacity.	Column 1, lines 32-35

Claim Language	Supporting Language in the Specification
Claim 30. The capacity modulated compressor of claim 29 wherein the valve is positioned in close proximity to the compressor.	Abstract; Summary; Fig. 1
Claim 31. The capacity modulated compressor of claim 29 wherein the valve is a bidirectional valve.	Column 1, lines 25-27
Claim 32. The capacity modulated compressor of claim 29	

EXHIBIT C

EXHIBIT D

Claim Language	Supporting Language in the Specification
Claim 33. A method of modulating the capacity of a compressor in an air conditioning or refrigeration system	Figure; Abstract; Column 1, line 65 to Column 2, line 48
comprising cycling a suction line valve, in fluid communication with the compressor,	Valve 54 in the Figure; Column 1, lines 25-27
using a cycle time shorter than the response time of the system to modulate compressor capacity,	Column 1, lines 32-25
the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,	Column 2, lines 32-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.	Column 2, lines 46-48
Claim 34. The method of claim 33	
wherein the valve is a solenoid valve.	Column 1, lines 25-27

Claim Language	Supporting Language in the Specification
Claim 33. A method of modulating the capacity of a compressor in an air conditioning or refrigeration system	Figure; Abstract; Column 1, line 65 to Column 2, line 48
comprising cycling a suction line valve, in fluid communication with the compressor,	Valve 54 in the Figure; Column 1, lines 25-27
using a cycle time shorter than the response time of the system to modulate compressor capacity,	Column 1, lines 32-25
the suction line valve being operable between open and closed positions to cyclically allow and prevent flow of refrigeration fluid into the compressor,	Column 2, lines 32-45
the suction line valve in the closed position in normal operation preventing refrigeration fluid flow to the compression chamber	Column 2, lines 32-37
other than optionally permitting a limited refrigeration fluid flow through the suction line valve to prevent vacuum pump operation.	Column 2, lines 46-48
Claim 34. The method of claim 33	
wherein the valve is a solenoid valve.	Column 1, lines 25-27